

Reliability Programs: Reliability Improvement Programs

ComEd Program
AM-CE-P005
Rev. 2

Effective: 6/20/2019
Supersedes: N/A
Review Type: 3 Years
Core Function: System
Performance

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1. Purpose

- 1.1. This document describes ComEd's reliability and maintenance programs that are designed to improve the distribution system's reliability performance by preventing outages and reducing the number of customers impacted by an outage. This document provides a high level overview of these programs with emphasis on reducing distribution SAIFI.

The reliability and maintenance programs consist of:

- **System Performance (SP)** – System Performance programs improves performance through modifications to system design and application of new technology and equipment to prevent outages and reduce the number of customers impacted by an outage. These programs include the Distribution Automation, Fuse Tap, Worst Performing Circuit Program, Lightning

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Protection Program, Mainline Cable Assessment and Replacement Program, Regional Reliability Programs, URD Treat and Replacement Program, Device Outage Frequency, ICC Customer Target program, Storm Hardening Program, and the Wire Down – Multiple Splices Program.

- **Preventative Maintenance (PM)** – The ComEd Preventative Maintenance program provides condition assessments of major distribution assets to ensure known defects are proactively identified and repaired. The program utilizes Performance Centered Maintenance (PCM) templates that were developed to address all transmission, substation, and distribution equipment that is owned, and / or, maintained by ComEd. Each template documents the program tasks, frequencies, failure modes, and maintenance basis for the associated equipment. Tasks and associated frequencies are designed to address known failure modes of the equipment covered by the template. In general, the tasks included in the PCM templates are the result of good industry practices, industry experience, and manufacturer recommendations.
- **Corrective Maintenance (CM)** – The Programmatic Corrective Maintenance program consists of the repair of the defects identified on maintenance inspections. This includes items such as blown arresters, broken cutouts and insulators, and other reliability driven defects.

Section 4 has been divided into the following subsections:

System Performance Programs

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2. Precautions and limitations

2.1. None

3. Prerequisites

3.1. None

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4. Program

4.1. DISTRIBUTION AUTOMATION

The Distribution Automation (DA) program is designed to install new field devices in order to reduce customer interruptions, expedite restorations, and improve the emergency responses and execution of switching orders. The DA programs also improve the possibility of increasing SAIFI impact when Fast-Trip capability is enabled during inclement weather.

4.1.1 AUTOMATED RECLOSER PROGRAM (12 kV AUTOMATION)

The DA Automated Recloser program installs automated reclosers on 12 kV distribution circuits. Reclosers reconfigure circuits into smaller “sections” which reduces the number of customers affected by a single outage. Stand Alone DA schemes include placement of an automatic recloser near the mid point of the circuit, in terms of the number of customers served. Automatic recloser loop schemes are also installed as a combination of an automatic recloser at the midpoint with an additional automatic recloser placed at a tiepoint. Loop schemes are used to enable greater restoration ability. Supervisory control (SCADA) capability is also installed to provide additional reliability benefits. Communication performance is monitored and corrective actions are implemented to enhance performance. The program targets circuits with a high impact on system SAIFI.

4.1.2 AUTOMATIC LINE RECONFIGURATION SECTIONALIZERS (ALRS) (34 kV AUTOMATION)

The ALRS program installs additional ALRS switches on the 34 kV systems to further expand its current automatic line reconfiguration capabilities. Peer-to-peer communication between ALRS devices is utilized to logically identify the faulted line section and perform automatic line reconfiguration to restore service to the non-faulted sections of line. This will avoid extended interruptions to customers served from 34 kV substations connected to the affected 34 kV line.

4.1.3 Line Sensor

The Line Sensor program installs communicating circuit faulted indicators (cFCIs) on overhead conductors to provide realtime data to operations to assist in fault locating. The sensor indicates in realtime if a fault is downstream or upstream of the sensor location. This allows dispatchers to send crews to specific switch locations based off of the sensor data to isolate and restore much more efficiently. These sensors can be installed on both the 12kV and 34kV systems.

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4.2. TAP FUSE

The Tap Fuse program identifies unfused taps off the main-stem of 12 kV feeders. Fuses will be installed, and customer interruptions will be reduced since a fault in the tap will only blow the fuse, not lockout the entire feeder.

4.3. WORST PERFORMING CIRCUIT PROGRAMS

4.3.1 ONE PERCENT (1%) WORST PERFORMING CIRCUITS

The One Percent program is a regulatory commitment (IL Admin Code Section 411.120) to improve the performance of the 1% worst performing circuits in each operating area. Selection of the worst performing circuits are based on one percent of the total distribution circuits in an operating area with the lowest performance (highest score) for the three reliability indices SAIFI, CAIFI, and CAIDI. For the purpose of reporting, the lowest performing circuits are defined as 1% worst performing circuits. The operating areas defined to the ICC are Chicago, Northeast, Northwest, and Southern regions. The calculation of SAIFI, CAIFI, and CAIDI are based on Distribution Circuit Interruptions. The 1% Worst Performing Circuit Program typically consists of approximately 100 to 130 circuits. Reliability Engineers perform a review of fusing, trimming, recloser application, arrester application, and pole condition. Maintenance Inspectors perform a targeted visual inspection of the circuit that identifies broken components such as cross-arms, poles insulators, cutouts, and blown lightning arresters.

4.3.2 CHRONIC WORST PERFORMING CIRCUITS

The Chronic Worst Performing Circuits program identifies the next worst performing circuits (WPC) that have had chronic reliability issues over multiple years. Unlike the 1% circuit list, the list is selected by using a system ranking versus a regional ranking and includes 34 kV circuits. The circuit risk score will be utilized to prioritize the final list. Corrective actions will be similar to the 1% Worst Performing Circuit approach.

The 4/12 kV chronic list is based on circuit SAIFI for both underground and overhead outages excluding unavoidable outages (i.e. public damage) and lightning related outages. Each candidate circuit on the list for the current year (e.g. 2011) is one of the top 100 SAIFI circuits for the previous year (e.g. 2010) and at least one other previous year to that (e.g. 2009 or 2008). One percent (1%) feeders and the three previous years' (e.g. 2008, 2009, and 2010) chronic feeders are excluded from the list. It is expected that ~20% of the 100 circuits will meet the multi-year criteria before the 1% circuits are excluded; it is expected that ~10 circuits will be selected per year.

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The 34 kV candidate list is based on both overhead and underground outages and excludes unavoidable outages like public damage. Lightning related outages are also excluded because circuits with a high number of lightning related outages should be considered for the lightning enhancement program. Circuit risk score is also considered. The selection criteria are based on the number of outages and the average customer interruptions per outage.

4.4. LIGHTNING PROTECTION PROGRAM

The Lightning Protection program targets upgrades for lightning protection on 12 kV & 34 kV circuits that have experienced a high number of customer interruptions due to lightning. Candidate circuits are analyzed utilizing lightning protection standards to provide the greatest impact on customer interruptions. Circuits chosen for the Lightning Protection Program will be those with the highest risk score. The multi-year Lightning Protection Program is expected to reduce the rate of outages per lightning stroke. A reduction of 0.001 equates to ~400 fewer outages or 55,000 avoided customer interruptions (based on 395,000 strokes per year).

4.5. MAINLINE CABLE ASSESSMENT AND REPLACEMENT PROGRAM

The Mainline Cable programs target feeders that have experienced a certain number of mainline failures caused by underground cable or underground cable accessory failures in a given period.

Benefits:

- Reduced customer interruptions
- Improved SAIFI
- Reduction in replacement scope

The Mainline Replacement program targets sections of a pre-determined length for full replacement.

The Mainline Testing program targets cable sections that are greater than the pre-determined length. The program involves VLF testing.

- For sections that pass VLF testing, no further action is required.
- For cable sections that fail VLF testing, immediate repair or replacement is required.

Examples of Test Candidates:

- Feeders outside of Chicago that is greater than 3,000 feet.
- Feeders inside of Chicago that are long branched Y-circuits, making identification of the specific problematic cable section difficult to pinpoint.

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The Chicago Cable Replacement program performs cable replacement at targeted locations of leaking, collapsed or bulged joints. Repairs typically replace lead with non-lead cable in both directions from the identified deficiency.

Risk Scores for Mainline Replacement and Testing are developed based on consequence and probability of failure with respect to the financial impact of the failure. The candidates are also prioritized based upon the optimal balance between the reliability budget allocation, historical performance, and SAIFI impact.

4.6. REGIONAL RELIABILITY PROGRAMS

The Regional Reliability program identifies improvements for both SAIFI, and customer satisfaction. Regional reliability councils will provide ongoing recommendations to resolve areas/devices experiencing repeated outages. Focus is on Focus Towns, Targeted and Focus Wards, as well as individual customers. Regional Reliability Councils will provide a forum for Engineering, External Affairs, C&M and Operations to develop and track municipal improvement plans.

4.7. URD ASSESS, TREAT, AND REPLACE PROGRAM

The URD Assess, Treat, and Replace (ATR) program is a customer satisfaction component of the system reliability strategy that remediates poor performing cable. The program targets bare concentric cable, which was installed between 1966 and 1985 (8,700) miles, much of ComEd's cable failures cluster around this aging cable. Risk Scoring is used to prioritize ATR candidates. Risk Scores for URD ATR candidates are developed based on consequence and probability of failure. The program proactively treats half loops through a combination of injection and replacement and targets miles of injection or replacement per year. The program will reduce the number of customers experiencing multiple interruptions in a given period due to cable failures.

4.8. DEVICE OUTAGE FREQUENCY PROGRAM

This program identifies devices that operated multiple times within short time frame (i.e. 4 months). Such devices are fuses, transformers and reclosers. Work may include a variety of actions such as: tree trimming, installing lightning arresters, coordination of tap fuse size, and re-spanning or replacing conductors. The program has also been expanded to include URD cable replacement on sections that serve a small customer count but has experienced multiple outages within a short time frame and resulting in a CAIFI ~ 3. These sections typically are not addressed by the URD Program due to the prioritizing of the list, which takes into account the number of affected customers.

4.9. ICC CUSTOMER TARGETED PROGRAM

The ICC Customer Target program is a regulatory commitment (IL Admin. Code Section 411.140) that requires Illinois utilities to address customers with year over

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year repeated interruptions (see below for criteria). This program utilizes an outage analysis process similar to that performed for the 1% worst performing circuits.

- 4 kV and 12 kV Circuits - This program addresses customers on the 4 kV and 12 kV systems that have experienced multiple outages or cumulative outage measured in time in a specific time period for consecutive years.
- 34 kV Circuits - This program addresses customers on the 34 kV systems that have experienced multiple outages or cumulative outage measured in time in a specific time period for consecutive years.

This program also utilizes a preemptive approach on reducing the number of customers reported to the ICC under the Customer Target list. For example, the previous two years are used to identify customers with more than 6 interruptions. The plan is to monitor the number of outages for these “at-risk” customers on a monthly basis in the current year and identify and address the customers before they make the ICC Customer Target list.

4.10. STORM HARDENING PROGRAM

The Storm Hardening program is designed to further reduce the susceptibility of circuits to storm-related damage and will include the deployment of a variety of engineered solutions, including, but not limited to, overhead-to-underground conversion (OTUC), installation of tree-resistant conductors (spacer cable), and additional vegetation management.

Benefits:

- Reduction of vegetation related outages
- Reduction of post storm walk downs
- Reduction of tree trimming cycle and costs
- Improve of SAIFI
- Improve of Customer Satisfaction

4.10.1 SPACER CABLE

The spacer cable solution is a part of the reliability toolbox and is used in areas with vegetation related outages where trimming is not practical. The spacer cable system is a messenger supported cable design that provides resistance to outages caused by contact with trees and wildlife. The compact design allows for a smaller envelope for tree trimming. Application of spacer cable is performed as a part of other reliability programs. Application is challenged to ensure that it is implemented as the optimal solution.

4.10.2 OVERHEAD-TO-UNDERGROUND CONVERSION

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Overhead-to-underground conversion is part of the reliability toolbox and is used mostly where smaller scale conversions would make sense and prove to be justifiable in terms of avoided storm related damages, costs, and improved reliability performance.

4.11. WIRE DOWN – MULTIPLE SPLICES PROGRAM

The Wire Down – Multiple Splices Program addresses areas of circuits that have three or more splices per phase per span by re-conductoring.

4.12. WOOD POLE

The purpose of this program is to assess the strength and structural integrity of the wood poles on a periodic basis (10 year cycle), to determine the required maintenance, to reduce customer interruptions due to wood pole failures, and ensure their safety and reliability on the electrical distribution system.

4.13. PROGRAMMATIC CORRECTIVE MAINTENANCE

The circuit patrol program is a visual inspection that identifies broken components such as cross-arms, poles, insulators, cutouts, and blown lightning arresters. This program includes the prioritized lists for the 4/12 kV and the 34 kV circuits that also incorporates hotspots identified by thermography inspection. It focuses on the higher reliability impact CM items which helps lower the number of distribution overhead equipment faults and customer interruptions.

To obtain the highest SAIFI impact from this program, circuits are prioritized prior to work scheduling. The ranking of circuits is driven by the number of Priority 30 CM items on the mainline, the circuit customer count, and the circuit risk score.

4.13.1 GRADE B

The Grade B Corrective Maintenance program addresses railroad and highway crossing that violate Grade B requirements. These locations are identified during maintenance inspections and typically go through engineering.

5. Roles and Responsibilities

- 5.1. CONSTRUCTION SUPERVISOR: Person responsible for the over all performance of construction personnel in meeting goals and objectives of the System Performance (SP), Preventive Maintenance (PM) and Corrective Maintenance (CM) Programs.
- 5.2. DESIGNER/ENGINEER: Individuals assigned to design and engineer electric infrastructure to serve expand/maintain distribution system capabilities. They identify jobs that require support and work with Project Management to determine the optimal project configuration.

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- 5.3. MAINTENANCE INSPECTOR: Perform a targeted visual inspection of the circuit that identifies broken components such as cross-arms, poles, insulators, cutouts, and blown lightning arresters.
- 5.4. PROJECT MANAGER: The Project Manager is responsible for ensuring that assigned projects are safely executed, on schedule, within authorized cost limits, and meet the requirements of the authorized scope.
- 5.5. PROGRAM MANAGER: Responsible for defining yearly programs scope and the implementation and execution of the various programs. Identifies reliability concerns and works with other internal organizations to improve results.
- Establishes cross-functional expectations with Engineering, Work Management, C&M, Project Management, and Vegetation management on program execution through program management of the reliability programs
- Defines metrics and communicates progress to senior management.
- Responsible to Identify and allocate appropriate funding to support the scope of the defined programs.
- 5.6. VEGETATION MANAGEMENT: Department assigned to perform vegetation/tree clearance work within the ComEd service territory

6. Documentation

- 6.1. None

7. Terms and Definitions

- 7.1. Automatic Line Reconfiguring Sectionalizer (ALRS): ALRS devices use peer-to-peer communication between one another to logically identify the faulted line section and perform automatic line reconfiguration to restore service to the non-faulted sections of the line.
- 7.2. Corrective Maintenance (CM): Work that is performed to repair or replace components identified as being degraded and that may adversely affect performance of the distribution system.
- 7.3. Customer Average Interruption Duration Index (CAIDI): CAIDI is defined as the average time required to restore the service. The sum of customer interruption minutes (customers affected times the outage duration) divided by the sum of the customer interruptions.

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- 7.4. Customer Average Interruption Frequency Index (CAIFI): CAIFI is defined as the total number of customer interruptions divided by the total number of distinct customers interrupted. CAIFI as defined for ICC includes outages of one minute or more.
- 7.5. Customer Interruption: A customer interruption is a controllable interruption lasting more than one minute and originating at a point that is between the circuit interrupting device at the substation supplying the distribution circuit and the distribution transformer.
- 7.6. Distribution Circuit/Feeder: A circuit owned and/or operated by ComEd and designed to operate at a nominal voltage of 34,000 volts or less and supplies one or more distribution transformers.
- 7.7. Distribution Circuit Interruptions: A controllable interruption lasting more than one minute and originating at a point that is between the circuit interrupting device at the substation supplying the distribution circuit and the distribution transformer.
- 7.8. Risk Score: An organizational wide process used by Reliability Programs to determine the risk-based prioritization scores for system performance projects and programs. The score is determined based on the probability of an event to occur and the impact of the event in the areas of reliability, safety, and environment. The area with the highest impact or score defines the risk score for that project or program.
- 7.9. Supervisory Control and Data Acquisition (SCADA): SCADA is a category of software application program for process control, the gathering of data in real time from remote locations in order to control equipment and conditions.
- 7.10. Spacer Cable: Spacer Cable is covered overhead wire that is specifically geared towards areas with intermittent vegetation contact providing resistance to outages caused by contact with trees and wildlife.
- 7.11. System Average Interruption Duration Index (SAIDI): SAIDI is the total duration of an interruption for the average customer during a given time period. It is calculated by dividing the total number of customer interruption minutes by the total number of customers.
- 7.12. System Average Interruption Frequency Index (SAIFI): SAIFI is internally defined as the total number of customer interruptions divided by the total number of customers served. This index excludes interruptions lasting 5-minutes or less in duration, planned interruptions and major events (events during which at least 10% of the customers within an operating area experience a sustained interruption during a 24-hour period).
- 7.13. System Performance (SP): System Performance (SP) programs improve reliability performance through modifications to system design and application of new technology and equipment.
- 7.14. Thermography: The detection of infrared radiation and conversion to a temperature dependent image by use of an infrared imager. Temperature variations are made visible and these thermal images may then be recorded and analyzed. This non-intrusive technique is used to monitor the operating condition of equipment and components.

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- 7.15. Very Low Frequency (VLF) Test: The VLF test is designed to drive the larger defects to failure under controlled test conditions followed by repair or replacement of cable.

8. References

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|------|--------------|--|
| 8.1. | (AM-CE-P176) | Device Frequency Program |
| 8.2. | (VM-ED-P035) | Vegetation Management: Distribution Corrective Maintenance Program |
| 8.3. | (AM-CE-P110) | One Percent (1%) Worst Performing Circuit Program |
| 8.4. | (AM-CE-P120) | Mid Circuit Recloser Selection and Installation Process |
| 8.5. | (PC-ED-P026) | Project Management – Centrally Managed Program |
| 8.6. | (CM-CE-P321) | Overhead Distribution Circuit Inspection and Maintenance |

9. Attachments

- 9.1. 2016 Distribution Blanket Project List

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10. Development history

Revision 0		Date: 6/24/2013
Writer	Brotson McThay (Reliability Programs)	
Reviewer(s)	Daniel Brotzman (Manager: Reliability Programs), Lucy Ballesteros (Reliability Programs), Daniel Barabas (Reliability Programs), Brian Beissert (Reliability Programs), Gerri Paramore (Reliability Programs), Peter Yan (Reliability Programs), George St. John (Reliability Programs), John Yancey (Manager: Distribution Automation), Darryl Mitchell (Manager: Engineering & Design), William Forst (Manager: Engineering & Design), Karon Richardson (Manager: Engineering & Design), Kenneth Cicirale (Manager: Engineering & Design)	
UFAM Approver(s)	William Gannon (Director: Engineering)	
Reason written	Created to meet an ACE investigation report to develop an overall Reliability Programs Management Model document.	

Revision 1		Date: 6/23/2016
Writer	Chun-Yu Ko (Reliability Programs)	
Reviewer(s)	Marina Mondello (Reliability Programs), Gary Van Cleave (Reliability Programs), Peter Yan (Reliability Programs), Scott Kish (Regional Reliability)	
UFAM Approver(s)	John Prueitt (Director: Engineering)	
Reason written	Periodic Review, updated category descriptions, and added PM/CM Programs.	

Revision 2		Date: 06/20/2019
Writer	Adam Gasiorek, Sr. Engineer (Reliability Programs)	
Reviewer(s)	Adam Gasiorek, Sr. Engineer (Reliability Programs), Daveed Yisrael, Sr. Engineer (Reliability Programs), Steve Walker, Mgr. Distribution Automation, (Distribution Automation)	
UFAM Approver(s)	Jaime Ortega, Reliability Analysis	
Reason written	Periodic Review, Updated Program List	

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Revision 3		Date: XX/XX/XXXX
Writer	Writer's name, title and work group	
Reviewer(s)	Reviewer's name and work group; Reviewer's name and work group; Reviewer's name and work group;	
UFAM Approver(s)	UFAM Name, core function and title	
Reason written	Brief description explaining why the process was written	

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9.1 2019 Distribution Blanket Project List

ITN	Project Name	Project Description
Baseline		
33373	Device Outage Frequency	This program identifies devices that operated 3 or more times within a short time frame (i.e. 4 months). Such devices are fuses, transformers and reclosers. Work may include a variety of actions such as: tree trimming, installing lightning arresters, coordination of tap fuse size, and re-spanning or replacing conductors. The program has also been expanded to include URD cable replacement on sections that serve a small customer count but has experienced at least 3 interruptions within a 4 month window and resulting in a CAIFI ~ 3. These sections typically are not addressed by the URD Program due to the prioritizing of the list, which takes into account the number of affected customers.
33992	Chronic Circuit Program	This program identifies the next worst performing circuits (WPC) that have had chronic reliability issues over multiple years. Unlike the 1% circuit list, the list is selected by using a system ranking vs. a regional ranking.
11161	1% Program	The program is a regulatory commitment (IL Admin Code section 411.120) to improve the performance of the 1% worst performing circuits in each operating area based on SAIFI, CAIDI, and CAIFI. Work includes installation of additional protective device installation, and possible circuit upgrades (e.g. arrester installation, conductor upgrades). Charge corrective maintenance to ITN 30422
6053	Lightning	The Lightning Protection Program targets upgrades for lightning protection on 12 kV and 34 kV circuits that have experienced a high number of customer interruptions due to lightning. Candidate circuits are analyzed utilizing lightning protection standards to provide the greatest impact on customer interruptions. Circuits chosen for the Lightning Protection Program will be those with the highest risk score. The multi-year Lightning Protection Program is expected to reduce the rate of interruptions per lightning stroke.
4928	Tap Fusing	This program identifies unused taps off the main-stem of 4 and 12 kV feeders. Fuses will be installed, and customer interruptions will be prevented since a fault in the tap will only blow the fuse, not lockout the entire feeder.
45715	Wire Down-Multiple Splice	This program address areas of circuits that have three or more splices per phase per span by re-conductoring.

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5066	ICC Cust Target Prog	<p>The program is a regulatory commitment (IL Admin Code Section 411.140) that requires Illinois utilities to address customers with year over year repeated interruptions. Also include the Pre-emptive portion of the Customer Target Program.</p> <p>4 and 12 kV Circuits- This program addresses customers on the 4 kV and 12 kV systems that have experienced more than six outages or more than 18 hours cumulative outage time in a 12-month period for three consecutive years.</p> <p>34 kV Circuits - This program addresses customers on the 34 kV system that have experienced more than 4 outages or more than 12 hours cumulative outage time in a 12 month period for three consecutive years.</p>
30752	Regional Reliability Work	<p>This programs identifies improvements for both SAIFI and customer satisfaction. Regional reliability councils will provide ongoing recommendations to resolve areas/devices experiencing repeated outages. Focus on Greenboard Communities and Underperforming Wards, address customers with pocket issues, focus on repeat device outages (leverage other programs).</p> <p>Project ID's with RRCS are for the Contractor Support portion of Regional Reliability.</p>
30753		
30754		
29238		
30422	General	<p>The circuit patrol program is a visual inspection that identifies broken components such as cross-arms, poles, insulators, cutouts, and blown lightning arresters. This program includes the prioritized lists for the 4/12 kV and the 34 kV circuits that also incorporates hotspots identified by thermography inspection.</p> <p>This program focuses on the higher reliability impact CM items which helps lower the number of distribution overhead equipment faults and customer interruptions.</p>
42336	Grade B	The Grade B Corrective Maintenance program addresses railroad and highway crossing that violate Grade B requirements. These locations are identified during maintenance inspections and typically go through engineering.
Mutiple	Prevetative Maintaince	Preventative Maintenance Programs include ALRS and Recloser Battery Replacements, Circuit/Pole/MH/Equipment Inspections
EIMA		
47231	12 kV DA	This program installs automated reclosers on 12 kV distribution circuits. Reclosers re-configure circuits into smaller "sections" which reduces the number of customers affected by a mainline interruption.
47232	ALRS SW Install	This program installs additional switches on the 34 kV system to further expand its current automatic line reconfiguration capabilities.

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47242	EIMA Storm Hardening	The Storm Hardening program utilizes engineered solutions to “harden” circuits against storms by reducing the susceptibility to storm-related damage, including high winds, thunderstorms and ice conditions. The program is aimed at hardening facilities but not directed at any defect or failure to properly design, engineer, construct, or maintain the existing system.
47233	Mainline Cable	The Mainline Cable Assessment and Replacement Program consists of cable replacement, manhole assessments and manhole refurbishment.
47234	Cable Diagnostics	See Mainline Cable
47235	URD Cable Replacement	The URD Assess, Treat and Replace (ATR) program is a customer satisfaction component of the system reliability strategy that remediates poor performing URD cable. The program proactively addresses URD cable loops through a combination of cable injection or replacement.
47235	URD Cable Injection	See URD Cable Replacement
47240	Wood Pole	The purpose of this program is to assess the strength and structural integrity of the wood poles on a periodic basis (10 year cycle), to determine the required maintenance, to reduce customer interruptions due to wood pole failures, and ensure their safety and reliability on the electrical distribution system.
GRIP		
49779	Grid Resiliency--OH Relocation/Reconductoring, Spacer Cable, Sectionalizing	Distribution Resiliency focuses on targeting areas with chronic/pocket reliability issues that drive customers experiencing multiple interruptions (CEMI) and extended interruptions (CEDI) and reducing the risk of large scale/front page events. Distribution Resiliency is also driven to achieve the EIMA regulatory performance metrics and Service Reliability Targets utilizing a blended approach of infrastructure improvements and enhanced vegetation trimming practices to increase the resiliency of the overall system and pocket areas to absorb stresses in all weather conditions.
	Grid Resiliency--OH to UG Conversion, Transformer Installation	
	Grid Resiliency--Air Flow Spoilers	
47491	DSM-34 kV PTS Replacement	The program scope is to replace existing switch types (AB Chance Cap and Pin, Bridges-Topper) with the current standard 600 ampere pole top switch.

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47495	DSM-4kV Pothead Replacement	The program scope is to modernize the 4kV Potheads over the next five years by replacing the obsolete "hand operated" devices with switches that cannot be operated while energized.
47496	DSM-Switching Table Replacement	The program scope is to modernize the 4kV Switching Tables over the next five years by replacing the existing switching tables with modern switches such as the G&W Trident 3 Phase Underground Switch.
47497	DSM-ATO Modernization	The program targets the replacements of Automatic Throw Over devices (ATO) that are obsolete and have no replacement parts readily available in case of failure. ATOs are designed to automatic switch or "throw over" to an alternate circuit if the normal circuit is de-energized, allowing continuity of service to the customer during a circuit outage. This equipment is considered and installed as an optional facility for customers requiring increased service reliability.
47502	DSM-Sectionalizing / Reduce number of Y-Joints	The program scope is to reduce the number of stops on feeder-sections over the next five years by sectionalizing feeders. There are estimated to be 50 feeder-sections with 18 or more stops requiring excessive manual switching and longer restoration time.
48480	DSM-Live Front Transformer Replacements	Replace 2 types of URD (Underground Residential Distribution) transformers with operational concerns due to their design with new dead front type transformers. Silo / Tub Live Front Transformer: In the late 1950's, a URD system was developed to serve residential subdivisions with underground cable. A typical transformer installation consisted of placing an overhead transformer and cutout in a tile enclosure. These are covered cylindrical enclosures set into the ground with about 2 ft protruding above the surface. Conventional Live Front Transformer: In the early 1960's, a single phase compartmental transformer was designed for placement on a concrete pad. It consists of two disconnects (in and out) and a transformer fuse with a protective enclosure which is installed with porcelain bushings inside the cabinet.
50089	DSM-Line Clearance	The program is designed to address the backlog of clearance issues to mitigate safety and regulatory liability concerns. Energized surfaces of primary equipment or conductors with inadequate clearance from the ground, adjacent buildings, fire escapes, billboards, signs and other obstructions in accordance with Company Construction standards pose a risk to public & employee safety.
Other		

Reliability Programs: Reliability Improvement Programs

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48421	Cutout Obsolescence Program	This program replaces obsolete cutouts identified by MI inspections
47492	Patched Transformer Program	This program replaces temp patched transformers identified by MI inspections